ber of spectra described here is no less than 121, and the star places have all been brought up to the year 1900.

COMET 1892 SWIFT (MARCH 6).—The ephemeris of this comet for this week is as follows :—

1892.	R.A. h. m. s.	Decl. ° ′	log Δ.	log r.	Br.
May 27	23 43 17	+35 36·6			
28	45 36	36 2·2			
29	47 54	36 27·4	0·1727	0·1297	0·42
30	50 10	36 52·1			
31	52 24	37 16·2			
1	54 36	37 39·9			
2	56 46	38 3·2	0·1821	0·1429	0·38

The brightness at the time of discovery is taken as unity.

On the 30th the comet will lie in the prolongation of the line joining v and θ Andromedæ, being about twice the distance from θ as is σ.

LIGHT VARIATIONS OF Y CYGNI.—In *Astronomische Nachrichten*, No. 3091, Prof. Dunér discusses the results of his observations, made during the interval April 1891 to April 1892, of Y Cygni, with respect to the cause of the anomalies in the light variations. The number of minima observed amounted to twenty-seven, and on their reduction (together with many others), by grouping the differences between observation and calculation in a particular way, the values for the normal deviations were obtained. These figures showed that the even and odd epochs deviated on the positive and negative sides respectively ; and from subsequent calculation, in which $\pm z$ represented constant deviation of the even from the odd minima, the numerical value of z was found not to be constant, but a slowly-increasing quantity. Mr. Yendell, who has previously considered this question, explained the possibility of representing such differences by a periodical function, but Prof. Dunér, assuming a systematic difference between the even and odd epochs, explains them otherwise—"that the star Y Cygni consists of two equally large and bright components, which revolve around their common centre of gravity in an elliptic orbit with a period of revolution of 2d. 23h. 54m. 44s. ; the perihelion passages occurring between the even and the odd epochs." If the value of z be found to be real, and not as at present only suspected, we might suppose "a third body, dark or only slightly luminous, which should cause a perturbation in the position of the lines of apsides, such as we recognize in the planets and satellites of our solar system."

To facilitate observation, Prof. Dunér gives an ephemeris for the times of minima expressed in Greenwich mean time. From the latest observations these times may be probably half an hour too late.

Epoch.	Minimum.		d.	h.	m.
1341	1892	June	9	9	33
1361		July	9	8	40
1381		August	8	7	46
1401		September	7	6	52
1421		October	7	5	58
1441		November	6	5	5
1461		December	6	4	12

NEBULÆ.—The *Monthly Notices* for April contain some notes on observations of nebulæ made by Mr. Burnham with the 36-inch refractor of the Lick Observatory. The work was undertaken by him during the months of September and October, 1891, in order to give fuller details concerning the descriptions, places, and actual existence of several of these objects included in the general catalogue. All the places derived from the measures are referred to the epoch 1860 of the general catalogue, while the numbers used in all cases are those of Dreyer's general catalogue.

During this survey, several new nebulæ were found, although no attempt was made to search for new objects. The following list includes some of these, together with some of the doubtful nebulæ :—

No. 707.—R.A. 1h. 44m. 31s., Decl. –9° 12′·0. In the immediate vicinity of this a new nebula was found, R.A. 1h. 43m. 31s., Decl. –9° 13′·4.

No. 874.—R.A. 2h. 9m. 43s., Decl. –23° 50′·5. No nebula found near this place. Probably a faint star had been seen, as many are near this position.

No. 942.—R.A. 2h. 21m. 30s., Decl. –11° 27′·2. Near this position are three fainter nebulæ, two of which have been observed before, but one quite new. The places for these three are Neb. (*a*) (new) 2h. 22m. 0 5s., Decl. –11° 27′·9 ; Neb. (*b*) 2h. 22m. 23·5s., –11° 28′·1 ; and Neb. (*c*) 2h. 22m. 22·7s., –11° 27′·6.

No. 988.—R.A. 2h. 28m. 34s., Decl. –9° 57′·9. No suggestion of any nebulosity about this star after very careful scrutiny.

Barnard.—R.A. 5h. 14m. 33s., Decl. + 3° 20′·7. In sweeping for this double nebula, another nebula was found in the immediate vicinity, R.A. 5h. 14m. 40s., Decl. + 3° 10′·4.

No. 1988.—R.A. 5h. 29m. 4s., Decl. + 21° 7′·7. Not the least trace of nebulosity here. Dreyer stated that Tempel pointed out that supposed nebula was only a false image of the star. New observation endorses this view.

No. 7447.—R.A. 22h. 53m. 6s., Decl. –11° 16′·7. This object certainly does not exist.

No. 1086.—Near this nebula are two others—

Neb. I. 2h. 40m. 49s., Decl. + 40° 28′·5.
Neb. II. 2h. 41m. 12s., Decl. + 40° 28′·6.

ANNIVERSARY MEETING OF THE ROYAL GEOGRAPHICAL SOCIETY.

THE anniversary meeting of the Royal Geographical Society was held on Monday afternoon, when the Right Honourable Sir Mountstuart E. Grant Duff was re-elected President. The following changes have taken place amongst members of the Council :—Sir Henry Rawlinson and Mr. Clements R. Markham have been appointed Vice-Presidents in the room of Sir Frederick Goldsmid and Sir Beauchamp Walker, both of whom remain on the Council, Sir Beauchamp Walker being appointed Foreign Secretary in place of the late Lord Arthur Russell. In addition to the Councillors who have been elected Vice-Presidents, the following have retired by rotation :—Sir George Bowen, Dr. R. N. Cust, Sir Alfred Dent, the Duke of Fife, and General Maclagan. In their place Lieut.-Colonel J. C. Dalton, Sir Arthur Hodgson, Mr. John Murray (the publisher), Mr. E. G. Ravenstein, Sir Rawson Rawson, and Colonel Tanner have been elected.

During the meeting the Royal Medals for the Encouragement of Geographical Science and Discovery were presented, the Founder's Medal being given to Dr. Alfred Russel Wallace in recognition of the high geographical value of his great works, "The Geographical Distribution of Animals," "Island Life," and "The Malay Archipelago," and his further claim for distinction as co-discoverer with Darwin of the theory of natural selection. The Patron's Medal was presented to Mr. Edward Whymper for the results of his journey in 1879-80, recorded in his work, "Travels among the Great Andes of the Equator," London, 1892, 2 vols., besides a volume on the aneroid barometer. The Murchison Grant for 1892 went to Mr. Robert Swan, surveyor and geologist, who accompanied Mr. Bent in his expedition to Mashonaland, making a careful route-map of the country traversed down to the East Coast at Beira ; the Back Grant to the Rev. James Sibree, for his many years' work on the geography and bibliography of Madagascar ; the Cuthbert Peek Grant to Mr. Charles W. Campbell, for his important journeys in Korea ; and the Gill Memorial to Mr. G. H. Garrett, for important geographical work done during the past fifteen years in Sierra Leone. Mr. Mackinder and Mr. Buchanan gave a short account of the Geographical Lectureships at Oxford and Cambridge. The scholarships and prizes given by the Royal Geographical Society to students in training colleges for 1892 were also presented.

The President delivered the annual address on the progress of geography, in the course of which, after referring to the evening meetings and to the Proceedings for the past year, he said :—

'With our meetings all Fellows of the Society who live in London, and with our Proceedings all Fellows of the Society, may be taken to be more or less familiar, but our Fellows by their contributions do a great deal more for their science than to make it possible to hold meetings and to publish Proceedings ; nor does it seem unadvisable to remind them, from time to time, what they are doing in other ways for science and the body politic. They are aware that an annual vote of £500 is taken in the Estimates in aid of the Society's finances. In return for that it is bound to keep open for the public at large, and does keep open, a map collection of great importance. During the last year some 2500 persons visited the map room, which is in charge, as you all know, of Mr. Coles, a most competent officer; but if we had more room we could be much more useful. We could, for example, store, in such a way as to make it quite easy to refer to them, all the 25-inch Ordnance Survey maps. That at present is perfectly out of the question. We should like also, if we had the space, to have a room where any Member of Parliament or person holding an official position could at once be supplied with all the information he could desire upon any of the innumerable questions where politics and administration cross the frontiers of geography.

"Another of our duties is to collect and keep together a large collection of books, maps, diagrams, photographs, and other helps to earth-knowledge. Of the first of these we have about 40,000, valued at not less than £10,000. Of the second and third, about 50,000 maps and charts and 7000 atlases; and of the fourth about 4000 copies, together valued at about £8000. We keep, too, a stock of instruments, which we lend from time to time to travellers who satisfy us that they can use them; £680 worth of these have been lent to Government officials since 1888. A further department of our activity is map-making. We have recently produced a large-scale map of East Central Africa, as well as maps of Persia and Tibet, edited respectively by Mr. George Curzon and General J. T. Walker, while we are constantly publishing in our Proceedings original maps which, but for us, would never see the light at all, or, if they did, only after an amount of delay which would greatly impair their usefulness.

"The same officer who presides so well over our map collection renders very useful services to the public, by giving instruction in surveying and practical astronomy to persons who are going into countries the geography of which is little known. Forty-eight servants of the Government, soldiers, sailors, and others, of whom twenty-one were employed on special service and boundary commissions, have recently taken advantage of this teaching. We receive too as students, at the desire of the Colonial Office, all officials who come to us before going out to West Africa, and pay half their fees, while our advice and help is always at the disposal of any of the Government Offices which desire to consult us on the choice and purchase of instruments.

"Another very important function which our Fellows enable the Council to fulfil, is the granting of direct subventions to intending explorers, and you all know what large sums have been given at various times for such purposes. Mr. Conway, a most experienced mountaineer, and a man of large scientific knowledge, started in the beginning of this year to explore the glaciers of the Karakorum. He received from us £250 towards his expenses, and a conditional promise of more.

"To Mr. Pratt, who read at one of the Society's meetings a very valuable paper on North-Western China more than a year ago, and who is now going through the regions, first clearly revealed to science by Mr. Bates in his delightful "Naturalist on the Amazons," to explore the still unknown or little known regions in the extensive valley of that great river, we have given a grant of £100, and have lent him instruments. If he adds considerably to geographical knowledge, our contribution may be increased at a later period. We have given a small grant in aid of a proposed inquiry into the Houssa language and people. To Dr. Nansen we have voted £300. The object of his expedition, it should be remembered, is not so much to reach the North Pole, as to explore the unknown Arctic region. This he proposes to effect, not by following the coast line of Greenland or Franz Josef Land, which might be the best plan *if* their coast lines extend much beyond the points already known; but to reach the edge of the hitherto untravelled region by the help of the surface currents which he believes cross the Polar region from Siberia towards Greenland.

"In the beginning of the year we published a circular prepared by the Orthographical Committee of the Council upon the spelling of geographical names. This was done in pursuance of the policy announced in the Proceedings for 1885, p. 535—a policy in which we were encouraged by observing that the charts and maps issued during the last six years by the Admiralty and War Office have conformed to our views; that the Foreign and Colonial Offices have done the same, and that the Government of the United States of America has adopted a very similar system.

"The death of Mr. Bates rendered vacant the office of Assistant Secretary, and the Council felt sure that it would consult the best interests of the Society by promoting to that position our late librarian, Mr. Keltie, who was made at the same time editor of the Society's publications. The vacancy caused by this promotion was filled after a very careful consideration by the appointment of Dr. H. R. Mill, who has done much already for scientific geography. Our cartographical department has been strengthened by the accession of Mr. Darbishire, a highly promising pupil of Mr. Mackinder's at Oxford, who has also had an excellent German training.

"The Council has requested three gentlemen, well known to the Society, to represent it at one or other of the Congresses to be held at Madrid, in the neighbourhood of Huelva, and at Genoa, in honour of the fourth centenary of the discovery of America by Columbus. The attention of many I address was doubtless called to the Congress at Berne, where, by the way, England 'was conspicuous by its absence' in the Educational Section. A strong wish was expressed there that the next Congress should meet in London, and the necessary steps have been taken to comply with that wish. A committee, of which Major Darwin is the head, is now engaged in initiating arrangements for a Geographical Congress to be held in 1895.

"Hardly inferior in importance to the duty of assisting well-considered exploration and supplying true explorers with an audience to applaud their discoveries—a duty laid upon the Society by all its past—is the duty laid upon it by the necessities of the present to assist in the wider diffusion of geographical instruction.

"In our attempts to increase the amount and improve the quality of geographical teaching in the country we had to put up with some grievous disappointments. We began as far back as 1869 by giving medals to be competed for by the principal English schools. Two schools, and two only, distinguished themselves in the competitions—Dulwich College and Liverpool College. As to the fourteen others, the less said the better. The Society, however, had no idea of allowing itself to be beaten by the *vis inertiæ* or *laches* of individuals. Mr. Freshfield, one of our honorary secretaries, himself an Etonian, was possessed with a perfect passion for giving to others the advantages in respect of geographical instruction which he had not enjoyed in boyhood. Mr. Bates, our late excellent assistant secretary, pondered long, as was his wont, as to whether we ought to throw a substantial portion of our strength into improving education, and having come to an affirmative conclusion, took the matter up with characteristic energy. The Council was of the same mind, and ere long it was determined—

"1. To send Mr. Keltie to report upon geographical teaching at home and abroad.

"2. To open, under the auspices of the Society, an Educational Exhibition, in which all the best appliances for the teaching of geography should be brought together.

"Mr. Keltie accordingly commenced his investigations, travelling very widely while he carried them into effect. His Report was published, and excited much attention. The Exhibition was open during December 1885 and January 1886, and was visited by several thousands of persons interested in education. The collection contained in it has been lent to the Teachers' Guild, and is now exhibited in the museum of that body in Gower Street.

"The movement thus inaugurated resulted in various changes in our policy. We concluded a treaty with the University of Oxford in 1887, and with Cambridge in 1888, by which it was stipulated that we should go shares with each of these learned bodies in paying the salary of a lecturer to teach geography to such of their members as choose to avail themselves of his services. An argument, if it deserves the name, has sometimes been advanced, to the effect that we should not teach geography at our Universities, 'because it is a graphy and not a logy!'

"Throughout Germany the question has been settled. In that country, as well as in Austria and elsewhere, professors of geography are lecturing, and lecturing to excellent purpose, without interfering either with the domain of their historical colleagues on the one side or their geological colleagues on the other. Whether it is taught or not taught in schools and Universities, geography must in the nature of things rule the territory in which the sciences relating to organic life, from history down to the structure of the humblest animate thing, meet the sciences which have to do with inorganic nature.

Call it a 'graphy,' or a 'logy,' or a 'Kunde,' or what you please, it remains the body of knowledge which has to do with the theatre of the activity of man and all things that have life. We may stunt and injure the activity of the next generation by refusing to teach it, but eventually it must obtain the position which the greatest of living systematic botanists claimed for it in 1886. 'It must permeate,' he said, 'the whole of education to the termination of the University career, every subject taught having a geographical aspect.'

"When, in spite of foolish objections, we had sown the seeds of what we may hope, having regard to the slowness with which trees grow in our English climate, to be vigorous saplings about the end of the century and respectable denizens of the forest in the year 2000, we turned to the training schools, and concluded a convention with the Education Department, whereby we engaged to give certain scholarships and prizes to such of their students as were reported by the Inspectors of Schools charged with the conduct of the examinations to be worthy of those distinctions. Then, further, we entered into arrangements in 1888, with the directing Delegates of the Oxford University Extension Lectures, by which we agreed to give, on certain conditions, a yearly grant of £60, in aid of geographical teaching. We have resolved to set on foot regular courses of geographical lectures in London, which will commence probably next November, and be given by Mr. Mackinder and other competent geographers.

"Our very latest measures for the improvement of geographical education have been :—

"1. To agree to some modifications in the distribution of the prizes to the training colleges which the officers of the Education Department advised, and which will better promote the object which the Society has in view.

"2. To co-operate with the Manchester Geographical Society in assisting the governing body of the Victoria University to introduce geographical teaching into the curriculum by making a substantial grant for that purpose.

"3. To award a travelling scholarship of £100—our share being £50—after an examination held at Oxford. This was gained by a young man, Mr. Grundy, who was bound, under the conditions prescribed, to travel for at least three months in one of a number of districts from which he might take his choice, and communicate the results to us. He has selected Bœotia, and will, I make no doubt, furnish the Society ere long with some valuable information.

"We continue the prizes given at the Oxford and Cambridge local examinations, and to the boys of the training ships. These belong to the same period of our history as the Public School medals, but with them we have been more successful. We are in correspondence with the Scotch Education Department as to the best method of further encouraging geographical study on the other side of the Tweed, where it has long been comparatively popular.

"It seems to me quite certain that this part of our activity will fill a larger and larger space in the thoughts of all of us for a long time to come. The day will arrive when it will be of very little importance. Common-sense has a way of conquering in the end, and the proposition that it is highly desirable for intelligent creatures inhabiting this planet to have a good general notion of the opportunities which it affords them is so self-evident, that one would think it did not require a very numerous and powerful Society to urge its general acceptance upon the scholastic world.

"Geography and history are relegated to a subordinate place in almost all our schools which consider themselves to belong to the first or second rank, while the utmost prominence is given, not to reading the classics, to getting thoroughly imbued with classical ideas, and to having the mind filled with whatever of good and great the ancient world has bequeathed to us, but largely to accomplishments in the way of turning out pretty pieces of verse or prose, in the ancient tongues, which bear much the same relations to serious intellectual pursuits as do to the proper works and ways of an intelligent dog the art of jumping through a hoop filled with paper, or that of balancing on his nose a piece of biscuit till he is told that it is 'paid for.' Educators who have given the best years of their lives to these accomplishments naturally abhor the idea of diminishing their importance, and when they are asked to find a reasonable place for history and geography in their schools they piteously point to their time-tables and say, 'How are we to manage it?' Manage it by the elimination of rubbish. Put composition the ancient tongues as a piece of regular 'school business' behind the fire, and greatly diminish the amount of time given to learning by heart in the interest of Latin and Greek composition. Neither geography nor history will ever obtain their proper position in education until we can get rid of the superstition as distinguished from the religion of the classics. No reasonable man who has a competent acquaintance with the subject can tolerate the idea of the classics being neglected. They form a most important part, and must always continue to form a most important part of literature, and literature is for a large class of minds a most excellent training. For a great many minds, however, it is not an excellent training, and to a considerable proportion of those susceptible of being trained by it the ancient languages present no attractions. I maintain that for a great many minds geography and history, well and carefully taught, would be much more educative than the two studies which as late as the time at which I took my degree, not quite forty-two years ago, almost absolutely monopolized attention in Oxford and Cambridge. Then, too, we must remember that while for everybody classics are mainly educative, and in a much less degree instructive, and while mathematics are instructive in a high degree only to those who are going into any of the no doubt numerous careers for which they are essential, geography and history are instructive in a very high degree to all, even to those to whom they are not educative.

"What I think we as a Society should keep chiefly in view is to try to have a clear and connected account of the leading facts which are known about the theatre of man's activity, together with an intelligent idea of the leading causes which have brought those facts about very much more widely extended through all ranks than they are now. We must keep our aims moderate in geography. There are undeniably a few persons to whom both geography and history, teach them as you will, are thoroughly abhorrent. Well, teach the very minimum of them to such people. A large number of people can be cultivated, and very highly cultivated, better through geography and history than anything else. All I ask for is, that in the education of such people these two sciences should play a very much larger part than they do now. I think that if we could see some thoroughly good hand-book of physical geography and another of political and commercial geography made part of the teaching of all secondary schools, and a subject of the leaving examination which should be borrowed from Germany, if we continue to hold up as we are doing at Oxford, and elsewhere, a very high standard of professorial teaching in our subject, while we at the same time persist in the other lines of educational activity to which I have alluded, we should have done a good deal; but it is far from improbable that we may ere long see our way to giving further stimulus to sound geographical teaching in various parts of the country. The Society, however, may be assured that we will remember the maxim *Festina lente*, and not waste the resources with which its members supply us in any rash experiments. Geography is rooted in the physical sciences, and makes each of them tributary to her, while history which is not rooted in geography, and which does not learn from geography all it has to teach about the existing conditions of man's dwelling-place, is simply bad history."

The President then referred to the year's exploration. Herr Merzbacher's work in the Caucasus, and Mr. Howell's ascent of Oræfa Jökull in Iceland, were noticed as the chief mountaineering feats. In Asia military exploration had gone on steadily on the northern frontiers, and the Society was making efforts to have the results of such work made more accessible to the public. Lord Lamington's journey in the Shan States, Captain Bower's and Dr. Thorold's adventurous crossing of Tibet also opened up new ground. In Africa Mr. E. A. Floyer crossed the Egyptian Desert from Assouan to the Red Sea; and in the region of the Great Lakes Captain Lugard, Emin Pasha, Dr. Stuhlman, and the late Father Schynse have added to our knowledge. The Italians have been energetic in exploring Somali land, and the French, despite the disaster to M. Crampel, have not abandoned their efforts to reach Lake Chad from the west. Captain Gallwey and Mr. Gilbert T. Carter have made important discoveries in Lagos and Benin. Mr. Bent's well-known exploration of Zimbabwe, and Mr. Joseph Thomson's study of Lake Bangweola, which ill-health still prevents him from recording, are the most important pieces of work in South Africa.

The semi-Arctic regions of Labrador and Alaska have received much attention in America, and their topography is being more definitely ascertained.

In Australia the Elder expedition has unfortunately collapsed, after doing much good work, but Sir William MacGregor has been very active in opening up British New Guinea.

Reference was also made to the progress of the hydrographic surveys in different parts of the world.

In the evening the anniversary dinner of the Society took place at the Whitehall Rooms, Hôtel Métropole, and was attended by a large gathering of Fellows, with many of the leading scientific men and members of the Diplomatic Service as guests. The President occupied the chair. A clever speech was delivered by Mr. Whymper, in response to the toast of "The Medallists." Mr. Bryce, Colonel Maurice, Prof. Flower, Mr. W. T. Thiselton Dyer, and Mr. Norman Lockyer responded to the toast of "The Allied Sciences and Sister Departments."

TRANSFORMERS.[1]

ALTHOUGH transformers are in constant use for changing alternating currents of electricity from high to low or from low to high potential, exact calculations concerning them have hitherto been looked upon by scientific men as impossible because of the complicated law of magnetization which must subsist in iron. Calculations on the assumption of constant magnetic permeability were thought to be worthless, therefore, although these were the only ones which could be made. Certain graphical methods of representing what occurred were, however, based upon the constant permeability hypothesis, and although such graphical methods could only be useful in illustrative work, they were thought to be accurate enough when great accuracy was impossible. The absence of a theory was supplied by vague statements regarding the effects of hysteresis; and the cycle of magnetization being supposed to be exactly the same, however rapidly performed, and Foucault currents being ignored, it was possible for any writer to get his literature on this subject published and read and commented upon.

Prof. Perry has for a long time preached the doctrine that the only theory of the transformer that can be carefully worked out—namely, that in which hysteresis is ignored—ought to be worked out and compared with experimental results; and he insisted that when the known phenomena of magnetic leakage and slight saturation and Foucault currents are taken into account, the results of this theory explain all observed experimental results.

In the present paper he takes up the general case of a transformer with many primary and secondary circuits with magnetic leakage, Foucault currents, choking coils and condensers in series with or in parallel to any or all the circuits. He clears away much of the old difficulty by proving that, in all calculations except that of the idle current supplied to an unloaded transformer, in all practical cases, exactly the same answers are obtained, to four significant figures or more, whether we assume the most complicated of hysteresis cycles or whether we assume the very simplest, which is that of constant permeability. It is, for example, interesting to observe that a formula never hitherto published as correct, often enough used by manufacturers as sufficiently correct for practical purposes, is really a very correct formula. It is also shown that the mathematical difficulties introduced by condensers and magnetic leakage efface themselves completely now that the complete problem has been attacked, and that the numerical working out of the most complicated cases is a very simple matter.

The one problem on transformers in which it is necessary to consider the law of magnetization of the iron—namely, the calculation of the idle current when the transformer is unloaded—is solved by the author in general terms, and he gives a simpler solution, which in his opinion agrees with all experimental results, although it assumes that there is no hysteresis in the iron.

SCIENTIFIC SERIALS.

THE only important paper in the *Nuovo Giornale Botanico Italiano* for April is an elaborate one by Signor G. Paoletti on the movements of the leaves of *Porlieria hygrometrica*. The structure of the plant is described in detail, and especially the anatomy of the "motor nodes" of the leaves and of the leaflets. He distinguishes in them two kinds of tissue, a motor system and a passive system. The cause of the movements appears to reside in the protoplasm and in the osmotic properties of the cell-sap. The author is unable to find in the leaves any hygrometric properties, the supposed presence of which was the reason for the specific name of the plant. The paper is illustrated by four plates.

THE greater number of the papers in the 2nd, 3rd, and 4th numbers of the *Bullettino della Società Botanica Italiana* for 1892 are chiefly of local interest to Italian botanists. Among those of a wider scope are the following:—Signor L. Macchiati describes an appearance presented by *Navicula elliptica*, which he considers strongly to confirm Castracane's view of the occasional reproduction of diatoms by internal germs.—Signor P. Pichi gives the results of experiments on the power of the vine to absorp sulphate of copper through the roots as a specific against the attacks of *Peronospora*. Analysis of the ash showed the presence of copper in leaves taken from both the upper and the lower branches.—Signor L. Piccioli gives some details respecting the destruction of plants by different kinds of land and freshwater snails, with the amount which is devoured of different plants. This is generally greater in the spring than in the summer.

IN the *Botanical Gazette* for April, Mr. G. E. Stone describes and figures a self-registering auxanometer, which can be readily constructed, of much simpler construction than those at present in use in botanical laboratories.—Mr. Conway Macmillan offers suggestions as to the classification of the Metaphyta, *i.e.* of the higher forms of vegetable life.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, April 28.—"On some Phenomena connected with Cloudy Condensation." By John Aitken, F.R.S., F.R.S.E.

This paper is divided into two parts. In Part I. are described the different influences which cause the condensation of a jet of steam when mixing with ordinary air to become more dense than it generally is, and in Part II. certain colour phenomena are described which have been observed when cloudy condensation is made to take place under certain conditions.

PART I.

Steam Jets.

It had been previously shown that when a jet of steam is electrified the condensation suddenly becomes very dense. In addition to electrification, it is found that this change in the appearance of the jet may be produced by other four causes. These five influences are: 1st, electricity; 2nd, a large number of dust particles in the air; 3rd, cold or low temperature of the air; 4th, high pressure of the steam; and, 5th, obstructions in front of the nozzle, and rough or irregular nozzles.

1st. *Electrification.*

It is shown that the mere presence of an electrified body has no influence on the steam jet. In order to produce the increased density the water particles in the jet must be electrified, either by direct discharge, or by an inductive discharge, effected by means either of a point or a flame.

The increased density produced by electrification is due to an increase in the number of water particles in the jet, by the electrification preventing the small drops coming into contact by their mutual repulsions, in the same manner as the water drops in Lord Rayleigh's experiments with water jets, which scatter more when electrified than when not electrified. The coalescence of the drops in water jets takes place only under the disturbance produced by the presence of an electrified body, while such a disturbance produces no effect on steam jets.

Other experiments point to the conclusion that the increase in the density is due to an increase in the number, and not to an increase in the size, of the drops. For instance, if steam is blown into a receiver full of air in which there are many nuclei, the condensation is dense, and, if there are few nuclei, the clouding is thin. The same holds good for the clouding produced by expanding moist air. If many dust particles be present, the clouding is dense; if few, it is thin. The action of the electricity does not seem to be positive, as it has no effect on a mixture of hot moist air and cold air. It seems rather to

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[1] Abstract of a paper read at the Royal Society, May 12, by Prof. Perry, D.Sc., F.R.S.